ORIGINAL

Docket #99-231

EX PARTE OR LATE FILED

November 11, 1998

HomeRF

404 Balboa Street
San Francisco
California
94118 U.S.A.

tel 415.750.8354
fax 415.751.4829
www.homerf.org

Dale Hatfield
Chief, Office of Engineering Technology
Federal Communications Commission
2000 M Street, Suite 400
Washington, D.C. 20004

Hand-carried

RECEIVED
SEP - 8 1999
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Dear Mr. Hatfield:

The HomeRF™ Working Group ("HRFWG") is a group of companies who are researching, developing, manufacturing and marketing a broad range of wireless radio appliances, primarily for use in the home. These applications include various high speed, short-range products, from components to special PC-based appliances and services. Many of these products will incorporate frequency hopping systems using the 2.4 GHz ISM band. Supporting companies participating in the HomeRF™ Working Group are listed in Attachment 1.

As set forth below, the HRFWG requests an interpretation of Section 15.247 of the Commission's rules, 47 C.F.R. §15.247, to permit flexible unlicensed operation in the 2.4 GHz ISM band, as set out below, as long as equivalent interference protection is provided and the parameters of operation described below are observed.[1] In the alternative, however, if the Commission decides that such an interpretation is not consistent with the current rules, the HRFWG urges the Commission to waive Section 15.247 in this respect, on an expedited basis, in order to allow industry to keep pace with the rapid advance of technology and with consumer demand.[2]

The HRFWG Envisions New Applications for the Home that Require Higher Speed and Increased Bandwidth

[1] Cf. 47 C.F.R. 27.53(a)(8).

[2] The consumer market for products using unlicensed Part 15 communications technologies is expected to grow to over one billion dollars per year by the year 2000. See In the Matter of 1998 Biennial Regulatory Review—Amendment of Part 18 of the Commission's Rules to Update Regulations for RF Lighting Devices, ET Docket No. 98-42, Comments of 3Com Corporation (filed July 8, 1998) at 3. A significant segment of that market will consist of new technologies that are being developed for the 2.4 GHz band.

No. of Copies rec'd 2 copies
List ABCDE

Section 15.247 of the rules for frequency hopping devices permits up to +30dBm EIRP; up to 1 MHz channel bandwidth (at –20 dBC adjacent channel) and up to 400 mSec channel occupancy based on a minimum of 75 hops within the 2400-2483.5 MHz band. Members of the HRFWG have devised a variety of communications protocols based on these rules, typically at maximum data rates of 1 to 2 Mb/s.

Based on the success of these and other products, the Commission has concluded that "the public interest is best served by providing for the continued availability [of the 2400 MHz] band for Part 15 equipment."[3] Part 15 operations in the 2.4 GHz band promotes the "introduction of new services and devices and the enhancement of existing services and devices...[which] will create new jobs, foster economic growth, and improve access to communications by industry and the American public."[4]

The HRFWG members envision a broad class of new applications in the home environment. These new applications and technologies, however, will benefit from wider bandwidth, higher data rates over shorter ranges, and faster hopping times than employed by frequency hopping spread spectrum systems in the past.

The HRFWG Proposal

To help foster commercial development and distribution of these new applications, the HRFWG requests that the Commission, by way of interpretation or waiver, permit operations in the 2.4 GHz band pursuant to the following frequency hopping parameters:

- Maximum 1 MHz channels – unchanged
- Maximum 3 MHz channels

Maximum power	+25 dBm EIRP

[3] Allocation of Spectrum Below 5 GHz Transferred from Federal Government Use, First Report and Order, ET Docket No. 94-32 (rel. Feb. 17, 1995), para. 1

[4] Id., para. 32

Maximum channel bandwidth	3 MHz
Maximum channel occupancy	50 mSec
Minimum number of hops	75

- Maximum 5 MHz channels:

Maximum power	+23 dBm EIRP
Maximum channel bandwidth	5 MHz
Maximum channel occupancy	20 mSec
Minimum number of hops	75

In all cases the definition of channel bandwidth should remain unchanged from current rules (-20 dBc energy or less out of channel bandwidth.) The two new categories will result in overlapping channels.

Adoption of the HRFWG's Proposal Will Not Cause Additional Interference to Existing Users of the 2.4 GHz Band.

The HRFWG's proposal is based on the fundamental principle, reflected in the Part 15 rules for unlicensed radio technologies, that Part 15 applications should not cause harmful interference to other users of the band, in this case, other Part 15 users as well.[5] Indeed, the HRFWG's proposal would afford equivalent or greater protection to all other users of the 2.4 GHz ISM band than do the current rules, strictly interpreted.

Even in the worst case, the net interference effect would be only equivalent to that allowed under current rules. The reason is simple. The increases in bandwidth are accompanied by proportionate reductions in maximum allowable power. For example, the 3 MHz channel is 5 dB wider than 1 MHz, but the maximum power is also 5 dB less. This means that if an ideal receiver with 1 MHz bandwidth is placed anywhere in the band, the total integrated interference energy received over an extended period of time (i.e., 30 seconds) is identical in all three cases. However, on an instantaneous basis, the 3 MHz and 5 MHz channel cases actually represent far less interference. This is because the power spectral density is reduced dramatically. The 3 MHz case is 10 dB lower and the 5 MHz case is 14 dB lower in interfering power to any existing 1 MHz channel receiver on an instantaneous

[5] See 47 C.F.R. e15.5(b).

basis. Furthermore, the HRFWG recommends a reduction for maximum channel occupancy from the current value of 400 mSec. Since the minimum number of hops remains unchanged at 75 hops, the net effect to other systems will be that devices built following the parameters outlined in the HRFWG's proposal, appear more like random noise in shorter time periods than under the Commission's existing allowances.

Allowing a Similar Degree of Flexibility for Frequency Hopping Systems as Recently Allowed for Direct Sequence Systems will Foster Competition and Greater Offerings at Lower Costs for Consumers.

The Commission recently granted direct sequence systems increased flexibility under the Part 15 rules.[6] The HRFWG believes that its proposal will place frequency hopping systems on a level competitive playing field with direct sequence systems. This competition will lead to an expansion of the number and variety of applications using both types of modulation schemes, which will, in turn, provide consumers with more choices in the market for wireless home appliances.

If the HRFWG's proposal is adopted, consumers can expect to have electronics that will offer wireless connectivity up to 6 Mb/s in the 3 MHz channel or 10 Mb/s in the 5 MHz channel—enough to permit wireless transmission of CD-quality audio and compressed MPEG2 video streams to portable devices from a home PC or information gateway—provided at a lower cost and improved immunity to interference than current direct sequence-based applications operating at comparable speeds. This technological and commercial advance would enhance competition, increase consumer choice, and drive down the costs of consumer electronics.

The HRFWG's Proposal is Significantly Different from Past Frequency Hopping Proposals.

The HRFWG is aware that the Commission has turned aside a number of requests to increase frequency hopping bandwidth in the past. The Commission has not viewed these

[6] See Amendment of Part 2 and 15 of the Commission's Rules Regarding Spread Spectrum Transmitters, 12 FCC Rcd 7488 (1997).

proposals favorably for either of two reasons: (1) the changes proposed would have increased the interference potential of Part 15 technologies to other users; or (2) the proposed decrease in the number of hops was such that the resulting technology could not be considered a true "spread spectrum" system. In the past, industry has been unwilling to decrease power in order to achieve increased bandwidth.

The HRFWG proposal is fundamentally different in three significant ways:

1. It will not increase interference to other users.

2. There is a decrease in power that is acceptable to all users.

3. There is no proposed decrease in number of hops (or "randomness of signal") to correspond to increased bandwidth.

Conclusion

In summary, the HRFWG members listed in Attachment 1 urge the Commission to grant its request for an interpretation or waiver of Section 15.247, as set forth above, to facilitate the development of new Part 15 spread spectrum technologies, and to further enable commercial application of these technologies.

Sincerely,

Ben Manny
Chairman

cc: Julius Knapp

Attachment 1

HomeRF™ Working Group Members

Acer America
Advanced Micro Devices
Aironet Wireless Communications
Alcatel Business Systems
Alps Electric Co., Ltd.
Analog Devices
Berkeley Concept Research
Broadcom Corporation
Butterfly Communications
Casio Computer Co., Ltd.
Cayman Systems
Cirrus Logic, Inc.
Cisco Systems
Compaq Computer Corporation
Epson Research and Development, Inc.
Fujitsu Ltd.
Global Converging Technologies
Hewlett-Packard Company
Honeywell
Hosiden Corporation
Intel Corporation
Interval Research
I-O Data Device
iReady Corporation
Kanda Tsushin Kogyo Co., Ltd.
Kansai Electric Co., Ltd.
LG Electronics, Inc.
Matsushita Electric Industrial Co., Ltd. (Panasonic)
Microsoft
Mitsubishi Electric Corp.
National Semiconductor
NEC Corporation
Nortel

Oki Electric Industry Co., Ltd.
Ositis Software, Inc.
Philips Consumer Communications L.P. (PCC)
Primax Electronics, Ltd.
Proxim
Raytheon Company
RF Microdevices
RF Monolithics, Inc.
Rockwell Semiconductor Systems
Samsung Electronics, Inc.
Sawtek, Inc.
Sharp Corporation
Siemens
Silicon Wave Inc.
S.Megga Telecommunications Ltd.
Symbionics
Symbol Technologies
Texas Instruments
Thomson Multimedia
WebGear, Inc.
Zilog